

THE GEORGE WASHINGTON UNIVERSITY
School of Government

U. S. NAVY GRADUATE COMPTROLLERSHIP PROGRAM

A DISCUSSION OF
MANAGEMENT ENGINEERING

For
SEMINAR IN COMPTROLLERSHIP
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Prepared By
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May 1953

THE HOUSE OF COMMONS
OFFICE OF THE SECRETARY

AND OF THE CHIEF CLERK

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I. INTRODUCTION

The role of the management engineer has assumed greater prominence in recent years, and the necessity for that specialization has been recognized by many administrators in many various fields. The position or function of the individuals thus employed has no set level in the scheme of things; instances can be cited which range from the job which is buried in an organization to that which is placed in the highest echelons.

The function of management engineering has received high recognition in government. Witness the number of such groups in the various departments, bureaus, and agencies, and the number of management surveys being undertaken by those groups and by professional consulting firms under contract.

The introduction of the position of the Comptroller in the Department of Defense and in the Department of the Navy, at least indirectly, raises a question relative to the position of the Management Engineer. A great many of the writings on the subject of Comptrollership charge that officer with responsibility for furnishing advice and functional guidance to management and operators in the field of "office methods, systems and procedures." Quite a few writings include the word "statistics"

I. INTRODUCTION

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in the Department of Defense and in the Department of the Navy
is just indicative of a position relative to the position
of the management engineer. A great many of the activities
subject of Governmental activity have been carried out with
the Government's advice and technical guidance to various
and operators in the field of "office methods, systems and
control." While a few writings include the word "management"

with the foregoing. From that statement of responsibility, the management engineering function is a responsibility of the comptroller, but it does not indicate the extent of the work--how deep into the organization and to what extent such work should be developed--nor does it indicate the point where the work of the internal auditor begins to overlap that of the management engineer.

In the military services, the function of the Management Engineer is recognized. In some instances the function is assigned as a separate entity on the staff, while in others the function is one of the Comptroller's functions.

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In the military service, the function of the
staff officer is recognized. In some instances the function
assigned as a separate entity on the staff, while in others
function is one of the organization's functions.

II. THE NATURE OF MANAGEMENT ENGINEERING

"Management Engineering is a vague term which really expresses a concept. This concept embraces the many staff activities, on an organized basis, that contribute in some measure toward controlling procedures, both operational and administrative in nature.

"Management is a collective name for those persons responsible for directing business operations. Engineering connotes the scientific or skilled approach. Thus, Management Engineering is a term that alludes to a precise evaluation of management, with recommendations based upon known results of experimentation under controlled conditions with very little weight upon the judgment factor."¹

"A careful analysis of a large number of business failures will disclose the fundamental causes of failure lay inside the company and within the control of its management...

"It therefore behooves the management and employers of business enterprises to examine their methods and systems of conducting business...

¹From lectures by Carl W. Clewlow at George Washington University, Spring term, 1953.

II. THE NATURE OF MANAGEMENT ENGINEERING

Management Engineering is a very broad term which covers a wide range of activities. This concept embraces the very field of management, on the organized basis, that contribute in some manner to the functioning of the organization, both operational and administrative.

Management is a collective name for those persons responsible for directing business operations. Engineering connects the scientific or skilled approach. Thus, Management Engineering is a term that alludes to a specific application of management, with recommendations based upon known results of experimentation under controlled conditions with very little weight upon the judgment factor.¹

A careful analysis of a large number of business failures will disclose the fundamental causes of failure lay side the company and within the control of its management...² It therefore behoves the management and engineers business enterprises to analyze their methods and systems of conducting business...

¹ This language by Carl W. Gilbreth is quoted in George Terpstra, *Management Engineering*, Springfield, 1931.

"There are two possible approaches to this problem of increased operating efficiency: one is to attempt to induce people to apply more effort to work faster; the other is to simplify the procedures for performing the work so that, with the same effort, more work will be accomplished.

"Systems analysis ... encompasses the design of planning tools for giving direction to the enterprise's activities--the development of programs for determining what should happen in the future; and the design of control tools to ensure that the plans are effected and the results evaluated. Analysis of operations which directly change the form of a product is usually known as production or methods engineering.

"Some of the more common titles of persons who perform some aspects of systems and procedures work are:...management engineer..."¹

In years gone by, businessmen have succeeded or failed often due to the efficiency with which they conducted their affairs. The storekeeper, the blacksmith, the farmer, and the wagon maker, among others, conducted their business affairs themselves. They called on lawyers for legal advice or hired a bookkeeper as needed, but by and large they ran their own show based on their own knowledge, training, and acumen. Many of the businesses were one man or family affairs. There were very few ventures employing more than a handful of men, and most of the

¹ Norman N. Barish, Systems Analysis for Effective Administration, Funk and Wagnalls Co., New York, 1951.

"There are two possible approaches to this problem:

Maximized operating efficiency; one is to follow the former

people to apply more effort in work habits; the other is to

pify the procedures for performing the work as now, with

same effort, more work will be accomplished.

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business sense was the responsibility of the owner.

In that capacity, he himself performed the elements of the management engineering function, along with all the other functions which today are specialties. With the advent of the large corporations employing hundreds and thousands of men which are common in today's business community, the management is passing from owners to professional managers. But even as the enterprises grew, the complexities of business increased. The owner could no longer personally attend to all the affairs. Lacking the skill, the knowledge, or the time, he turned to specialists to perform the newly recognized function, while he concentrated on operations, production, sales, design, or any area in which he felt qualified.

"Administration is the determination and execution of policies involving action. So far as may be, these policies must be adaptable and adapted to constant changes. Such policies must be conceived by men; such action must be effected by human organizations; and both policies and action inevitably react on human beings."¹

Toward the end of the last century, administration began to be recognized as a science; many men devoted much time to increasing quantity and quality of output. Many papers were prepared on the various aspects of the subject. Efficiency was not

¹Wallace B. Donham, Administration and Blind Spots, Lake View Press, Framington, Massachusetts, 1952.

Business cases are the responsibility of the owner.

In that capacity, he himself develops the business of the management, engineering function, along with all the functions which today are specialized. With the advent of the large corporations employing hundreds and thousands of men and are common in today's business community, the management is passing from owner to professional managers. But even as the entrepreneur gives the ownership of business interests, the owner could no longer personally attend to all the affairs. Involving the staff, the knowledge, on the line, he turned to an efficient to perform the newly recognized function. While he is concerned on operations, production, sales, design, on any one in which he has position.

"Administration is the coordination and supervision of policies involving action. As far as we go, these policies must be adaptable and elastic to constant changes. Such policies must be formulated by men; each action must be effected by human organization; and only policies and action themselves remain human beings."

Toward the end of the last century, administration began to be recognized as a science; and was devoted more time increased quantity and quality of output. Many papers were written on the various aspects of the subject. Administration was

confined to the output of the production workers, and methods were developed to improve the output of the so-called service workers. Management continues to seek more efficient means and to make better use of facilities that are available. Many improvements are strikingly simple.

Consider the possibility of several similar sets of records being maintained, based on an equal number of reports; or the submission of reports which have become habit through the years, but which are not used; or the maintenance of records for the only reason that reports are received which have been prepared because someone is keeping records. Much time and effort has been saved by simply consolidating or eliminating reports, with the added result of increased efficiency. The rapid growth of businesses has led to wasteful conditions which have become a part of the operation, and which can be discovered only by systematic analysis.

The objective of management engineering is to assure the best administration and management commensurate with the cost, and to help meet the needs of the manager in the performance of his primary function.

continued to the output of the production process, and continues
very difficult to separate the output of the so-called services
sector. However, evidence is seen more often than not
to show better and more realistic than the available. They are
generally are strikingly similar.

Consider the possibility of several other ways of
records being maintained, based on an equal number of reports
or the submission of reports which have become habit through
the time, but which are not used in the maintenance of records
for the only reason that reports are received which have been
prepared because someone is making records. That they are of
little use has been noted by many economists as illustrating an
error, with the added result of increased efficiency. The
rapid growth of maintenance has led to various conditions which
have become a part of the operation, and which can be discussed
only by systematic analysis.

The objective of management engineering is to remove
the most outstanding and dangerous consequences with the
end to help meet the needs for safety in the performance of
his primary function.

III. THE MANAGEMENT AUDIT

One of the methods used by management people to improve conditions is the management audit. It can be performed by company personnel or by an outside firm specializing in such work. The final report of such an audit should present the administrator with an objective study of his operation along with suggestions for improvement.

The business community accepts as standard practice the yearly audit of accounts and the yearly inventory. The periodic management audit is likewise gaining wider acceptance. The size of the business should have no effect on the decision to conduct the audit. The object is to take a look at the operations as a whole from a position not submerged in the workaday routine. The extent of the audit is dependent on the cost, and is more or less determined on the potential results considered in the light of the cost. Perhaps a check list of questions would suffice, opening up avenues for self-improvement.

Such a checklist of questions generally applicable to all businesses was prepared in 1947 by the Policyholders Service Bureau, Group Insurance Division of the Metropolitan Life Insurance Company of New York. The outline includes (1) General Management, (2) Personnel Management, (3) Production Management, and (4) Marketing Management. The questions are in thirty groups

and cover all phases, running from, "Is your organization set-up in accordance with a definite plan...?" to "Are your local press relations such as to promote favorable publicity for your company?"

The starting point in a Management Audit is of course the organization. To begin with, an organization is nothing more than a group of people working together to accomplish a desired result. Through the years, students of the subject have found that there are basic principles of sound organization. The various types of organization have been proven by experience, be they line, staff, or a combination. A good organization helps to achieve the goal.

The study should first consider what other studies of the same organization have revealed. Any previous recommendations or conclusions should be considered in light of present day conditions. Then the organization should be studied from the point of view of the functions or goal of the group. The conclusions should lead to an organization structure as simple as possible and not to an elaborate creation which would only hinder productivity, and to one which should be as flexible as possible.

In the organization study, management must determine the objective--stating what the organization wants to accomplish, listing all directives and statements of policy. Management must then indicate the people who are depended upon to meet the objective. Their duties, responsibilities, and capabilities are set forth. Then follows the job of finding the best organization

company?

The standing point in a management study is of course the organization. The human side, as emphasized in modern work, is a group of people working together to accomplish a task. Through the years, however, the human side has been somewhat neglected. The human side of organization has been known by various names: staff, staff, or organization. A good organization is a good staff.

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designed to meet the objectives and to make use of the talents of the present employees.

One of the reasons that management audits should be conducted by outside firms is that company people are frequently reluctant to criticize the executives and, conversely, executives frequently do not like criticism from staff workers.

The April 1953 issue of "The Controller" carries an article by Bruce Payne, titled "Building and Maintaining a Successful Organization," in which the author writes about executives and their problems in organization. An effective organization must meet and stay ahead of competition. A complete management study should point up problems and indicate the underlying causes of the difficulties.

"The first step in preparing any company to meet today's ever-changing problems is a thorough survey and study of the situation as it now exists." This requires a statement of the objective, and a study of the executives charged with meeting that objective. Thenext step is to set up a workable organization plan, define the duties of each department and each executive, and develop a method for measuring executive performance. Frequently this takes considerable work and careful consideration because "like a tree which has been growing in the wrong direction, a company cannot just be pushed back on the right path, it must be reorganized and retrained."

Many management studies indicate that:

1. Executives spend too much time on functions which can

and should be performed by other employees.

2. Executives fail to adjust to the change in size of the business or of their own responsibilities, finding it difficult to delegate specific duties to others.

3. Overeager executives take over duties not rightfully their own.

"An important step in good executive organization is making sure the jobs done by executives are management jobs."

Most executives need training in leadership and coordination of the work of their subordinates. A school for junior executives is needed in most companies, in every kind of business and industry; and is particularly important for men entering the executive group. One good reason is that they should learn the scope of the duties of their fellow executives. Junior executives are a company's best insurance.

There should be some system of standards and incentives for an executive. One of the methods of measuring performance is the use of the operating budget, but he cannot "be judged fairly if he is overburdened with non-management functions, if he does not have adequate authority, or if he has not been properly trained..." Executives are human beings--money incentives are important, and recognition for a good job is stimulating.

The article closes by pointing out that these are but a few of the points to be examined, that it should be a thorough study, and that the job is not complete until all necessary changes are made and provision has been made for periodic rechecks and follow through.

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IV. PROCEDURES

Procedures describe the conduct of the operations of a business. They are often called methods or systems, represented by the standard routines and practices that become the standard procedures. These have been developed through experience and they represent the "one best way" of performing a given operation which is performed often enough to make a standard desirable.

"Procedures are of two main types: (1) administrative, and (2) operating.

"Administrative procedures are general instructions dealing with matters of policy, organization, and coordination. They explain how policies are to be applied and carried out and clarify organization assignments and relationships affecting several areas of the company. They are of primary interest to the management level and do not contain much detail or routine.

"Operating procedures supplement administrative procedures and other general material by describing the specific steps involved in carrying out company activities and operations. Several operating procedures may stem from one broad procedure or policy. They may affect several areas of the company... Since they contain more of the how, they are often longer and more detailed..and may refer to forms, reports, and other paper work...

They range from interdivisional procedures to individual job instructions..."¹

There are several large companies who set up procedures to be used with the office equipment which they produce. These systems and procedures together with the equipment are selected on the basis of the special problem at hand, and naturally are tailored to the needs of the equipment and forms which will be used. These procedures are a result of a special study by the equipment company.

The methods study is a like device. For instance, when flow of working papers is involved, a special form with special symbols is used to chart the movement of the working papers with an indication of the work performed at each of the various stops. By this study, the stopping points which could be eliminated or combined are highlighted, back tracking can be eliminated or perhaps justified, and so forth. Modern office equipment might be installed on the justification furnished by the study. Mechanical devices might replace much of the work. Modern equipment has changed much of the office routine; it produces more work, more efficiently and more expeditiously; and much more information is accumulated for the needs of the administrators. One other beneficial result of a study frequently is a simplification of an operation which has grown to be a complex one for no other reason than it just grew.

¹Lillian Doris, editor, Corporate Treasurer and Comptroller Handbook, Prentice-Hall, New York, 1950.

...of

There are several large companies who sell in general to be used with the other equipment which they produce. The systems and procedures together with the equipment are based on the basis of the special machine of hand, and generally the control of the hand of the equipment and hand which will be used. These procedures are based on a special study of the equipment company.

The second study is a like device. For instance, when time of working space is involved, a special form with special systems is used to record the movement of the working space with an indication of the work performed at each of the various steps. In this study, the working space which may be obtained as machine are identified, such as hand and identified as separate facilities, and no other. Further, the equipment which is involved in the facilities provided by the study. Technical devices which require work of the worker. Modern methods of control work of the other workers. The process work work, work efficiency and work efficiency. The work work efficiency is recommended for the work of the position. The other technical terms at a work study in a simplification of the operation which has been used in a work study.

William L. Taylor, Editor, Engineering Research and Development, New York, N.Y.

V. MEASURING OUTPUT

Generally speaking, there are two ways of measuring individual output: (1) time and motion studies on an individual basis, and (2) averaging the total output of a group. The object of both types of studies is to improve the productivity of the employee. The methods involved are applicable to all types of work. The idea is embraced in the term "scientific management."

The principle objection to work measurement stems from the fact that it can be used as a speedup device which forces the worker beyond his normal capabilities. Approaching the problem on a scientific basis however, the employee is taught the right step to take under the right conditions, and so forth. Perhaps the result is better lights, colored paint, or the like; but the object is to raise the employees "normal" output by making the work easier for him to do naturally.

One of the functions of the Comptroller lies in the area which includes the productivity of the clerical worker who represents "office production." The best method in this area is probably the use of statistical reports of work performed. It is the simplest method available. The need for studies is indicated by the fact that production workers support the clerical workers, and therefore the productivity of the latter must

V. RESEARCH DESIGN

Research design is a plan or blueprint for the study. It is a set of decisions and procedures that guide the researcher in the collection, analysis, and interpretation of data. The design of a study is crucial to the validity and reliability of the results. The design of a study is determined by the research objectives, the research questions, the research hypotheses, the research methods, and the research procedures. The design of a study is also influenced by the research context, the research setting, and the research participants.

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be increased. It should be noted that such studies on a wide basis were first made on production workers and that clerical workers have become the object of wide study only in recent years.

The standards which have been developed through these studies are similar in application as those for manufacturing operations. They form the basis of the estimate of a fair day's work, which, when used with the workload, can be used as the basis for estimating the number of employees required. Workload must be related to requirements for men and equipment. It is a part of proper planning.

When anticipated workload is estimated, and clerical standards are applied, the requirements thus projected take their proper places in the budget. The application of rates of pay is a routine proposition when the number and type of employees are known. It must be recognized, however, that the workload data is but an estimate. It must be flexible in that the variations of workload must be reflected in the expense figure represented in the budget. By improving the output, it is obvious that the expense figure will be lower at any of the various levels of workload.

The systems of measuring output will vary from one company to another, or from one section to another. The problem is to develop a system suitable to the particular instance. The first two requirements are (1) the determination of the unit of measurement, and (2) the determination of the level of measurement.

It is important to know that the above information is for informational purposes only and should not be used for any other purpose. The information is not to be used for any other purpose.

The weather is quite good today. The temperature is about 75 degrees Fahrenheit. The humidity is not too bad. The wind is from the south at about 10 miles per hour. The sky is blue with a few white clouds. The water is clear and calm. The beach is sandy and clean. The people are friendly and helpful. The food is delicious and affordable. The overall experience is very good.

[illegible]

The system of measuring output will vary from one country to another, as from one nation to another. The world is divided into three regions in the political system. The first two regions are (1) the Western Hemisphere and (2) the Eastern Hemisphere, and (3) the Eastern Hemisphere of the world.

One of the Measurement Bulletins of the Bureau of the Budget lists the following criteria to aid in selecting the unit of measurement:

1. The work unit must be countable
2. The work unit must express output
3. The work unit must reflect effort
4. The work unit must have consistency
5. The work unit must be expressed in familiar terminology.

The desirability of standards of productivity is two-fold. They will indicate a measure of effectiveness when applied to work accomplished, and they will indicate manpower requirements when applied to anticipated workload. Tentative standards used in statistical measurements should be subject to constant review because of changing methods, procedures, and operating conditions. Any such changes should be indicated in the reports in order that the reports are interpreted and evaluated in the proper light.

When attempting to apply the principle of work measurement, it should be realized that it is not a cure-all, nor is it a magic formula which furnishes the manager complete operating information. Work measurement reports do furnish the manager with invaluable information on which to base decisions, provided that the data is properly interpreted and that the limitations of the measuring and reporting system are realized fully.

Work measurement reports should furnish experience data on workload and rates of output. The relation of workload and the

one of the most recent editions of the Survey of the
Budget lists the following criteria to aid in selecting the
of research:

1. The work will be valuable
2. The work will be original
3. The work will be timely
4. The work will have practicality
5. The work will not be covered in familiar

Ministry

The availability of standards of productivity is the
first. They will indicate a measure of effectiveness and they
to work harmoniously, and they will indicate various systems
when applied to enterprise systems. Therefore standards are
statistical measures aimed at subject to constant review
cases of changing methods, procedures, and operating conditions
but such changes should be indicated in the reports in order
the reports are interpreted and evaluated in the proper light.
from attention to their the potential of new means
and, it should be noted that it is not a matter of, but to
a major factor which influences the entire business operation
formation. Very important reports to provide the necessary
investable information on which to base decisions, provided in
the data is properly interpreted and that the limitations of
operation and reporting system are well understood.

From management reports should furnish information
on various and types of output. The relation of output and

rates of output should furnish, in turn, the manpower requirements for the measured operation. The conversion of manpower requirements to budget estimates is a relatively simple process. A sound system of measurement supported by summary workload and output information should make a budget's justification easier because it is backed up by facts.

VI. THE INTERNAL AUDITOR

One function generally conceded to come under the responsibility of the Comptroller is internal auditing, or more simply, auditing. It is sometimes called internal control. From the point of view of management, internal auditing is another method of effectively controlling a business.

An audit generally is thought of as an examination and verification of accounting records and reports. To many people it is represented by the few paragraphs signed by representatives of a firm of auditors and attached to financial statements, to the effect that the auditors have examined the records of the business in accordance with the current practice and that the statements fairly represent the condition of the business, etc. That represents but one type of audit, commonly called the "external audit."

Management has a responsibility to the stockholders for the protection and wise use of corporate funds, property and other assets. This is a responsibility of the top management. As the size of the business increases, the manager must have help to insure that this responsibility is met. The manager must have control, and a system of internal control becomes a necessity.

The following is a very short and practical set of objectives for a guiding policy covering internal auditing. It

VI. THE INTERNAL AUDITOR

One function generally conceded to have under the responsibility of the Controller is internal auditing, or more simply, auditing. It is sometimes called internal control. From the point of view of management, internal auditing is an aspect of effectively conducting a business.

As audit generally is thought of as an examination and verification of accounting records and reports. To many people it is represented by the few statements signed by representatives of a firm of auditors and attached to financial statements. The effect that the auditor has on the records of the business is represented by the various practices and procedures which are followed in the collection of the statements, at that represents but one type of audit, commonly called the "external audit."

Management has a responsibility to the stockholders the position and what are of corporate funds, property and other assets. This is a responsibility of the top management at the time of the business. However, the manager must have to know and this responsibility is not. The manager must control, and a system of internal control is necessary. The following is a very short and general list of factors for a system which covering internal auditing. It

represents the thinking of the Institute of Internal Auditors:

"1. Determination that all procedures involved in the recording and physical handling of all or any of a company's business are such that a minimum possibility of loss exists, considering also the cost of providing protection.

"2. Determination that all of a company's assets, liabilities, income and expense have been properly accounted for; that value was received for expenditures; and that collectible income to which the company is entitled has been or will be received.

"3. Determination of the extent of compliance with established rules and policies of the company relative to matters properly subject to audit."¹

Previous mention was made of Management Audits. Thus the following quotation indicates a relationship between management engineering and internal auditing.

"Actually, the management audits pick up where balance sheet audits leave off. They involve an examination of the operations of a company and each of its departments. They appraise the efficiency and effectiveness of the operation examined and determine what should be done to raise the level of substandard departments so that all operations will be on the highest plane practicable. Where annual management audits are conducted, comparisons are made by departments of current results with prior

¹Walker and Davies, Industrial Internal Auditing, McGraw-Hill, New York, 1951.

represent the interests of the Institute of Internal Auditors
"1. Information that all procedures involved in
the recording and physical handling of all items of a company
business are such that a minimum possibility of loss exists,
considering the cost of avoiding such loss.

"2. Information that all of a company's assets,
liabilities, income and expenses have been properly accounted for
that value has been determined and that collection
income in which the company is entitled has been or will be
collected.

"3. Defalcation or the intent of defalcation with
established rules and policies of the company relating to such
property subject to audit.

Previous mention was made of the company's internal control
the following statement indicates a relationship between such
and management and internal auditing.

"Actually, the management on the part of these firms
which would issue off. They involve an examination of the o
tion of a company and each of its departments. They represent
the efficiency and effectiveness of the operation executed and
determine what should be done to bring the level of performance
reporting to show all operations will be on the highest level
possible. Some annual management audits are conducted, or
particular are made by departments of current results with other

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McGraw-Hill, New York, 1951.
Internal Auditing, McGraw-Hill, New York, 1951.

conditions in order to point up improvements achieved or required. In many respects, these management audits correspond with the broader phases of internal audits."¹

When the definitions go beyond the field of correct accounting records and statements, the possibility exists that they conflict with the field of the management engineer. But, as previously indicated, the manager has the responsibility for managing the business in the best possible manner, with all its ramifications. To assist him in those jobs apart from the main operations, he has a staff of specialists. The staff people get the facts to help him set the policy, find the best procedures for meeting that policy, and collect sufficient data to insure compliance with that policy. In other words, it is a system of control.

Various members of the management team set the policy in their own areas, consistent with the policy determined by the highest echelon. The management engineering staff assists in publication of the policies, i.e., manuals; they assist in setting up good systems and procedures; and they appraise the results. A recheck might indicate the desirability of a change in policy or a change in procedure.

The auditor, independently, is insuring compliance with the policy. Quite naturally, one of the policies is to have

¹ Doris, op. cit., 1951, chapter 20.

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[illegible]

adequate control in the form of checks and balances. If he should find a lack of control, his report would be expected to include a recommended step to correct the deficiency. If he finds a situation which if changed would promote efficiency, he would be expected to make an appropriate recommendation, be it a change in policy or a change in procedure. The recommendations might or might not be subject to review by the management engineer.

The gist of the difference is probably best indicated by the following questions: (1) Does the management engineer determine the procedure for good internal auditing?, or (2) Does the internal auditor audit the activities of the management engineer? That policy might well determine that both groups are but sections of one group. The functions have their similarities. The people should report to the highest echelons. They are staff personnel and first have to "sell" themselves to the operators. And finally, many people will agree that the duties require individuals who are well rounded in administrative knowledge and who are specialists in given areas, i.e., banking, inventory control, purchases and so forth.

The foregoing is not meant to imply that the work of the management engineer is the same as that of the internal auditor. They are separate fields of endeavor or specialization which at several points tend to overlap, if recent writings on the function are compared. They both are management staff assistants whose findings are accepted, rejected, or combined by the manager. In any individual company, the areas of each function

undoubtedly will be differently set forth by the individual manager. His decision will be based on what he wants, on what he thinks it should be, on what his experience has been, and on the personalities and capabilities of the personnel concerned.

undoubtedly will be differently set forth by the individual
members. The decision will be based on what he feels, and
as things it should be, on what his experience has been, and
his own conclusions and suggestions of him - personal observations.

VII. APPLICATION IN THE FEDERAL GOVERNMENT

The various agencies of the federal government are making use of the tools of the management engineer. Many have been the surveys, conducted by the agencies themselves, by professional consulting firms, and by special committees. The Hoover Commission studied the complex organization of the government and came up with definite recommendations calculated to increase efficiency. Particular attention has been given to bureaus, agencies, and individual activities.

The Management Engineer in the Navy acts as a consultant and advisor to all the civilian executive assistants and their staffs on problems of business administration. This involves the development and maintenance of efficiency and economy in the operation of the Naval Establishment. The office of the management engineer reviews, plans, coordinates, integrates and evaluates management programs within the Department and the Shore Establishment, with particular regard to matters of organization, staffing, administrative procedures, and the utilization of personnel, material, and facilities.

One of the needs of managers is facts on which to base decisions, to compare activities, and to make forecasts. One facet of this business of gathering facts is the work measurement program. In practically every agency, a special unit has been

established in the organization to collect factual information and to compile that information in the form best suited to meet the needs of management. Establishment of a measuring system involves many problems which can be listed as follows:

- "1. Development of a suitable classification scheme.
2. Determination of the areas of measurement.
3. Selection and definition of the unit of measure.
4. Development of a system of records and reports.
5. Analysis and interpretation of data.
6. Timely and useful presentation."¹

In several ways involving comparison, the output of an organization can be measured, if a unit of measurement has been determined. It can be compared with a standard performance, or it can be compared against other similar activities.

In the Navy, the general choice has been made to use the number of man hours expended in the given areas of work. The engineers have assumed that the various departments and divisions in the various activities perform similar work, and that suitable comparisons can be made. The comparisons are made through the use of index numbers. For instance, the operations of cutting grass and maintenance of railroads have been measured, to cite but two of the many operations subject to work measurement.

The development of systems has been left mainly to the various bureaus which exercise technical control. Most of the

¹Session 10, Conference on Budget Execution, Bureau of the Budget.

involve many problems which can be listed as follows:

major activities have Public Works Departments, Supply Departments, and Medical Departments, and most of them are confronted with similar problems at each activity. Generally, technical bureaus have prescribed the various methods to be followed. But each activity will often argue that they have special problems which no other activity has to face. The one area which is not measured is the quality of the output.

All the information accumulated and reported must be interpreted and evaluated in the light of the actual operating conditions. Those people who must make the reports and who are affected by decisions based on the reports must be convinced that the program is sound and that it will increase their productivity.

major activities have been the Department of Health, Education and Welfare, and the National Science Foundation, and most of them are working with similar problems of basic research, development, and education. The Department has established the various research in the following. It has been active with other agencies that have been working together in which an other agency has been active. The one area which is a measure in the quality of the work.

All the information accumulated and reported must be interpreted and analyzed in the light of the social conditions. These people who make the reports and who are affected by decisions based on the reports must be involved. The Department is aware that it will increase their participation.

VIII. CONCLUSION

There is no real uniformity regarding the location of the management engineer in an organization. This is probably due to the recent growth of the concept recognizing the need for such specialization. Suffice it to say that there is a need for such knowledge, made more compelling by the modern complex organizations; and that the managers need specialized assistants on their staffs. This recognition should extend through all levels of management.

It is felt that some general statements regarding the management engineer can be listed:

1. He must be in one of the highest echelons of management if he is to function effectively. Often this spot is under the Comptroller.

2. Matters which are the concern of only one department are better left to the discretion of the cognizant department manager. (A production engineer generally should be on the staff of the production manager.)

3. In order to be effective, the individual must sell himself and his recommendations to the operators, because (a) without confidence on their part, they quite naturally tend to submit reports reflecting a work pattern which they think will look good to management, and (b) the lack of genuine cooperation

might lead to the failure of an otherwise sound plan.

4. He must give due credit to the good ideas generated by the operators, and, in particular, should not claim them as his own.

5. He must realize that, unless informed to the contrary, he is only a staff man working for the manager.

6. His recommendations must "make sense" all around, and due consideration should be given to the desires and inclinations of those who must carry them out. Remember, if he wants reports, someone has to prepare them.

7. And finally, one of the dangers of management engineering is the possibility and tendency to attempt to overmanage. Much time and effort can be saved if some enthusiasm can be curbed. A well-run outfit should not be disturbed simply because it isn't included in the program. There are areas for which there is no known good system of measurement. Lengthy reports and elaborate charts prepared by the management engineer for management too frequently are read or studied only by the management engineer.

In many readings mention was made of the training of specialists, the specialty of management engineers, and other specialties and specialists. It would seem that good administrators should be generalists, and that training should develop people with a wide point of view.

might lead to the failure of the operation some risk.

4. We must give due credit to the fact that the
of the operation, and, in particular, should not allow
the work.

5. We must realize that, unless we follow the correct
theory, we are only a waste of money for the company.

6. The recommendation must "stand alone" and must
and the recommendation should be given to the board and the
board of directors and must carry their full endorsement. It is
essential to have the board's endorsement.

7. The theory, one of the elements of management, is
applied to the possibility of failure, as shown in the
theory. When the risk and effort are added to some individual
can be shown. A well-organized effort can be organized and
because it is not included in the program. That is, the
which there is no direct good system of management. Finally,
reports and reports are given by the management and
the management and the theory are used as a guide only by the
management system.

8. The management system was used by the board of
directors. The possibility of management system, and other
considerations and objectives. It would seem that good management
should be established, and then working about the
level with a wide range of ideas.

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